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ABSTRACT

Many questions about the associations between risk factors and drug use remain unanswered. Data originally obtained from seventh graders participating in a school-based prevention program were examined in terms of a theoretical model. A series of multiple regression analyses were then conducted to select those risk factors which contributed unique variances in predicting individually five types of drug use: alcohol, cigarettes, marijuana, cocaine, and a composite of hard drug use. A final measurement model indicated the psychometric soundness of the relationship among the measured and latent constructs. Conceptually, a risk factor methodology supports the notion of a multiple pathway model for predicting adolescent drug use. The concept of multiple pathway model suggests a need for different prevention strategies tailored for specific high-risk groups. Educational intervention strategies that target multiple risk factors, aimed at specific high risk groups, can help to inoculate individuals from experiencing the deleterious effects associated with a drug using/abusing lifestyle. Differentiating patterns of risk for drug use is critical toward the development and implementation of sound primary prevention strategies. Five tables and two figures are included. (ABL)

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Predicting Drug Use During Adolescence:

A Structural Development Model

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There is little research concerning risk factors and preadolescent drug use. Substance using behaviors typically begin during early to middle adolescence and these years have been the focus of much investigation. Moreover, the pandemic use of licit and illicit drugs by youthful teenagers has stimulated some concern regarding efficacy of current prevention strategies. Some stimulus for this position has been provided by recent program reviews which have characterized secondary-school primary prevention efforts as lacking a grounding in a clear and consistent theoretical base.

Etiological research has implicated a wide array of psychosocial, behavior, and environmental correlates of adolescent drug use. Conceptually, interpersonal influences have been empirically linked to predicting initiation while intrapersonal factors have been linked to heavy use of drugs. Nevertheless, the development of heuristic and comprehensive models of drug use acquisition, maintenance, and exacerbation have been unable to be built on a single causal influence.

Only recently have a number of researchers applied risk factor methods to understanding stages of drug use and drug use progression with youthful populations. Empirically this research has demonstrated that a single unit-weighted risk index is linearly and monotonically related to severity of drug use. Some researchers have noted that although risk factors methodology is more parsimonious than previous theoretical models, a single unit-weighted risk index may not be enough to account for all forms of youthful drug use.

Several questions remain unanswered from these earlier studies. If risk factors are conceptually separated according to their ability to predict initiation and experimental use versus a more problematic and heavy use, do different associations between risk and drug use emerge? Moreover, using longitudinal data, which enables a researcher to track developmental trajectories, are the specified constellation of behavioral and psychosocial risk factors stable over time?

Using a two-wave cross-lagged panel design data originally obtained from seventh graders participating in a longitudinal school-based prevention program were examined in terms of a theoretical model containing two conceptually separate risk indices both measured at two points in time. Students responded to multiple assessments containing survey measures tapping self-report drug use, and select items corresponding to the different psychosocial, attitudinal, and behavioral correlates of drug use. Merged with these results were school archival records containing relevant information on school-related deviant activities.

Derivation and extraction of risk factor predictor scores proceeded utilizing exploratory factor analysis with maximum likelihood extraction and oblique rotations. A series of multiple regression analyses were then conducted to select those risk factors which contributed unique variances in predicting individually five types of drug use including: alcohol, cigarettes, marijuana, cocaine, and a composite of hard drug use. Hard drug use was infrequent in this sample, which necessitated combining the hard drug use items into a summary scale to maximize the available variances. Twenty-nine select risk factors were then dichotomized using an extreme quartile criteria.

Two unit-weighted, summed indices of risk factors were created at each assessment point: one predicting initiation/experimental use and the other for predicting problematic/heavy use. Conceptual organization of predictor domains was provided by the Jessor's problem behavior proneness theory, a social-psychological common factor model, and Kandel's developmental stage model. Domains were preliminarily constructed as interpersonal, intrapersonal, and behavioral-environmental. Moreover, risk factors were qualified as to their proximal or distal effect in precipitating experimental and initiatory drug using behaviors or a more problematic type of drug use. This decision was based on a thorough and copious examination of existing literature and consultation with professional experts in the drug abuse field.

Based on examinations of distributions for drug use patterns these youth are best characterized as just beginning to experiment with various illicit substances. Experimentation with illicit drugs revolved around the use of marijuana which increased significantly in consumption between seventh and ninth grade. Alcohol and cigarette use declined during the two-year time span, though alcohol was consumed by a majority of the sample at both Time 1 and Time 2.

The kurtoses and skew for cocaine and hard drug use were quite high and reinforced the knowledge that these substances are not commonly used in this youthful cohort. Although normally regarded as a hard drug type, cocaine use was kept separate in light of recent societal attention paid to this drug and its unique psychoactive properties.

Cross-lagged and concurrent zero-order correlations for the four risk indices and five drug use measure indicated greater magnitude of associations between the problem/heavy risk indices at both Time 1 and Time 2 and the five drug use measures. For cigarette and cocaine use within-time associations between the problem/heavy risk index were stronger at Time 1 than at Time 2. Conversely, for alcohol and hard drug use within-time associations at T2 were of greater magnitude. Magnitude of within-time associations for marijuana and the problem/heavy risk index were equivalent at Time 1 and Time 2.

In order to ascertain whether an element of causality existed between risk and subsequent drug use a series of path regression models were employed using latent-variable structural modeling. Prior to implementing the regression model verification of the adequacy of

the hypothesized measurement model was tested using confirmatory factor analysis. A general polydrug use latent factor was hypothesized representing a continuous latent tendency of drug use.

A final measurement model indicated the psychometric soundness of the relationship among the measured and latent constructs. Across-time relationships were strongest for soft drugs and less so for hard drug use which appeared infrequent in this youthful sample. Stability of psychological risk was indicated by the different associations, both convergent and divergent, for the initiation risk indices and problem/heavy risk indices. In order to further test causality a series of structural models were implemented. Regression coefficients indicated highly significant stability effects for both the initiation and problem risk indices when partialling for the effect of prior drug use. Somewhat weaker relationships existed between polydrug use at Time 1 and Time 2 indicating that polydrug use was not well established in this youthful sample.

Specific across-time regression effects existed between risk and drug use with greater magnitudes for the problem risk index. These findings supported the notion that the constellation of risk factors that underlie the problem/heavy risk index were strongly associated with soft drug use in the two-year time span between assessments and somewhat less strongly associated with hard drug use.

In addition, substance specific effects existed between marijuana at Time 1 and cigarette use at Time 2 confirming the previous empirical evidence of smoking specific relationships. Alcohol consumption at Time 1 had an inverse relationship with the initiation

index at Time 2 reinforcing the commonly held belief that limited consumption of alcohol can be socially facilitative. Hard drug use at Time 1 predicted the initiation risk index at Time 2, though these results must be viewed with caution since the distributions for the hard drug types were extremely skewed.

Conceptually, a risk factor methodology supports the notion of a multiple pathway model for predicting adolescent drug use. The concept of multiple pathways suggests a need for different prevention strategies tailored for specific high-risk groups. Educational intervention strategies that target multiple risk factors, aimed at specific high risk groups, can help to inoculate individuals from experiencing the deleterious effects associated with a drug using/abusing lifestyle. Differentiating patterns of risk for drug use is critical toward the development and implementation of sound primary prevention strategies. Specific high-risk target groups can be identified through needs assessments and risk profiles. Appropriate interventions can meet these needs reducing risk factors amenable to intervention and remediation.

able 1

Distributions (Percentages) for Drug Use Items

Panel Cases T1

Lifetime Use Measure

Drug Index	Never	Once or Twice	3-9 Times	10-39 Times	40-99 Times	100+ Times	r_{pbi} sex difference[1]
Alcohol	25.1	23.5	21.2	19.0	6.4	4.8	-.05
Cigarettes	41.5	27.7	10.0	10.6	5.1	5.1	0.15*
Marijuana	79.4	7.1	4.2	4.8	2.6	1.9	-.00
Cocaine	94.2	3.5	1.0	1.0	---	0.3	0.01
Hard drug[2] index	83.9	[M = 1.08 SD = 0.33 skew = 6.95 kurtosis = 61.9]					-.02

Distributions for T2 Panel Sample[3]

Past Month Use Measure

Drug Index	Never	Once or Twice	3-9 Times	10-19 Times	20+ Times	r_{pbi} sex difference	X^2 T1-T2
Alcohol	37.9	31.2	21.9	6.4	2.6	-.13*	36.5**
Cigarettes	70.4	10.3	3.2	2.9	13.2	.19***	37.1**
Marijuana	76.2	7.4	5.1	5.8	5.5	-.12*	30.5**
Cocaine	94.2	2.6	1.9	0.6	0.6	-.06	9.5**
Hard drug index	88.1	[M = 1.06 SD = 0.28 skew = 10.1 kurtosis = 123.43]				-.02	5.8*

Note. N = 311 for T1 and T2.

[1] positive point-biserial correlation indicates that the female subjects had the larger value.

[2] Composite of pills (sedatives and stimulants), inhalants, psychedelics, PCP, and heroin. Percentages available only for (0) Never category.

[3] Males n = 139; females n = 170.

*p< .05. **p< .01. ***p< .001.

Table 2

Multiple Regression Analyses for Reduced Set of Risk Composites:

Unstandardized Partial Regression Coefficients

T1 Risk Factor Composite	T1 Drug Use Criterion				
	Alcohol	Cigarettes	Marijuana	Cocaine	Hard
Riskier attitudes towards drugs	.55***	.72***	.56***	.20***	.14***
Negative utilities alcohol	.51***		-.19*		
Negative utilities marijuana		.55***	.65***		
Positive utilities marijuana			.44***	.11*	
Negative utilities pills	-.19m	-.29**	-.26**		
Positive utilities pills			-.24*		.12**
Peer affect toward school		.27*		-.10*	
Peer/friendship bonding			.39m		
Happy/dysphoria				-.22m	-.26**
Affiliation with children		.31*			
Orientation to success	.43*	.33m			
Academic Orientation	-.57*				
Positive school climate	-.49*				
Locus of control failure				-.20*	-.15*
R^2	.35	.44	.49	.19	.21
F value	16.1***	24.0***	29.5***	7.5***	8.1***

Note. N = 717.
m = marginal significance, p < .10
*p< .05. **p< .01. ***p< .001.

Table 3

Summary Statistics and Cut-off Points for Final T1 Risk Factor Composites

Risk Factor Composite	M	SD	Range	Cut-point	percent at risk*
			Initiation/experimental risk factors		
Peer/Friendship Climate	1.69	.23	1-2	≤ 1.57	23.5
Affiliation with Children	1.74	.33	1-2	≤ 1.67	38.6
Academic Performance	1.73	.26	1-2	≤ 1.60	17.4
Positive School Climate	1.68	.29	1-2	≤ 1.44	16.4
Perceived Freedom in School	2.37	.62	1-4	≥ 2.75	17.0
Peers Affect Toward School	2.58	.42	1.3-3.88	≤ 2.33	22.2
			Problematic/heavy risk factors		
Happy/Dysphoria	1.85	.21	1-2	≤ 1.78	24.4
Orientation to Success	1.75	.31	1-2	≤ 1.67	41.8
Bonding to Teacher	2.65	.42	1.4-3.94	≤ 2.40	20.9
Locus of Control Failure	1.74	.21	1-2	≥ 1.88	39.9
Number of Deviant Problems	2.44	1.95	0-12	≥ 3.00	3.2
Riskier Attitudes Toward Drugs	2.07	.81	1-5	≥ 2.53	26.4
Negative Util for Alcohol	1.93	.69	1-4	≥ 2.40	21.2
Negative Util for Pills	1.61	.67	1-4	≥ 2.00	24.4
Positive Util for Pills	1.51	.65	1-4	≥ 1.87	20.9
Negative Util for Marijuana	1.84	.78	1-4	≥ 2.40	18.0
Positive Util for Marijuana	1.71	.78	1-4	≥ 2.25	18.3
Perceived Peer Attitude Toward Soft Drugs	2.67	1.11	1-5	≥ 3.67	18.0
Perceived Peer Attitude Toward Hard Drugs	1.94	1.06	1-5	≥ 2.78	25.7
Perceived Peer Soft Drug Use	3.31	1.41	1-6	≥ 4.33	28.0
Perceived Peer Hard Drug Use	1.88	1.15	1-6	≥ 2.28	21.2

Table 3 (cont).

Summary Statistics and Cut-off Points for T2 Risk Factor Composites

Risk Factor Composite	M	SD	Range	Cut-point	percent at risk
		Initiation/experimental risk factors			
Peer/Friendship Climate	3.08	.38	1.5-4	≤ 2.88	33.4
Academic Performance	2.87	.63	1-4	≤ 2.50	12.5
Positive School Climate	2.56	.63	1-4	≤ 2.25	24.1
Perceived Freedom in School	2.36	.61	1-4	≥ 2.50	24.1
Peers Affect Toward School	2.44	.41	1-3.5	≤ 2.25	22.8
		Problematic/heavy risk factors			
Happy/Dysphoria	3.08	.41	1-4	≤ 3.00	12.2
Bonding to Teacher	2.62	.34	1.4-3.6	≤ 2.42	17.4
Locus of Control Failure	1.77	.21	1-2	≥ 1.90	24.8
Number of Deviant Problems	2.3	1.99	0-13	≥ 3.00	6.1
Riskier Attitudes Toward Drugs	2.42	.86	1-5	≥ 3.06	24.4
Negative Util Alcohol	2.24	.68	1-4	≥ 2.71	24.1
Negative Util Pills	1.69	.75	1-4	≥ 2.20	19.9
Positive Util Pills	1.56	.73	1-4	≥ 1.87	21.5
Negative Util Marijuana	2.09	.82	1-4	≥ 2.60	22.2
Positive Util Marijuana	1.88	.87	1-4	≥ 2.50	19.6
Perceived Peer Attitude Toward Soft Drugs	3.21	.90	1-5	≥ 4.00	10.9
Perceived Peer Attitude Toward Hard Drugs	2.07	.98	1-5	≥ 2.71	25.4
Perceived Peer Use of Soft Drugs	4.21	1.18	1-6	≥ 5.00	21.5
Perceived Peer Use of Hard Drugs	1.93	1.11	1-6	≥ 2.28	20.9

Note. T1 (N = 717) and T2 (N = 481)

Figure 1. Graph of risk indices

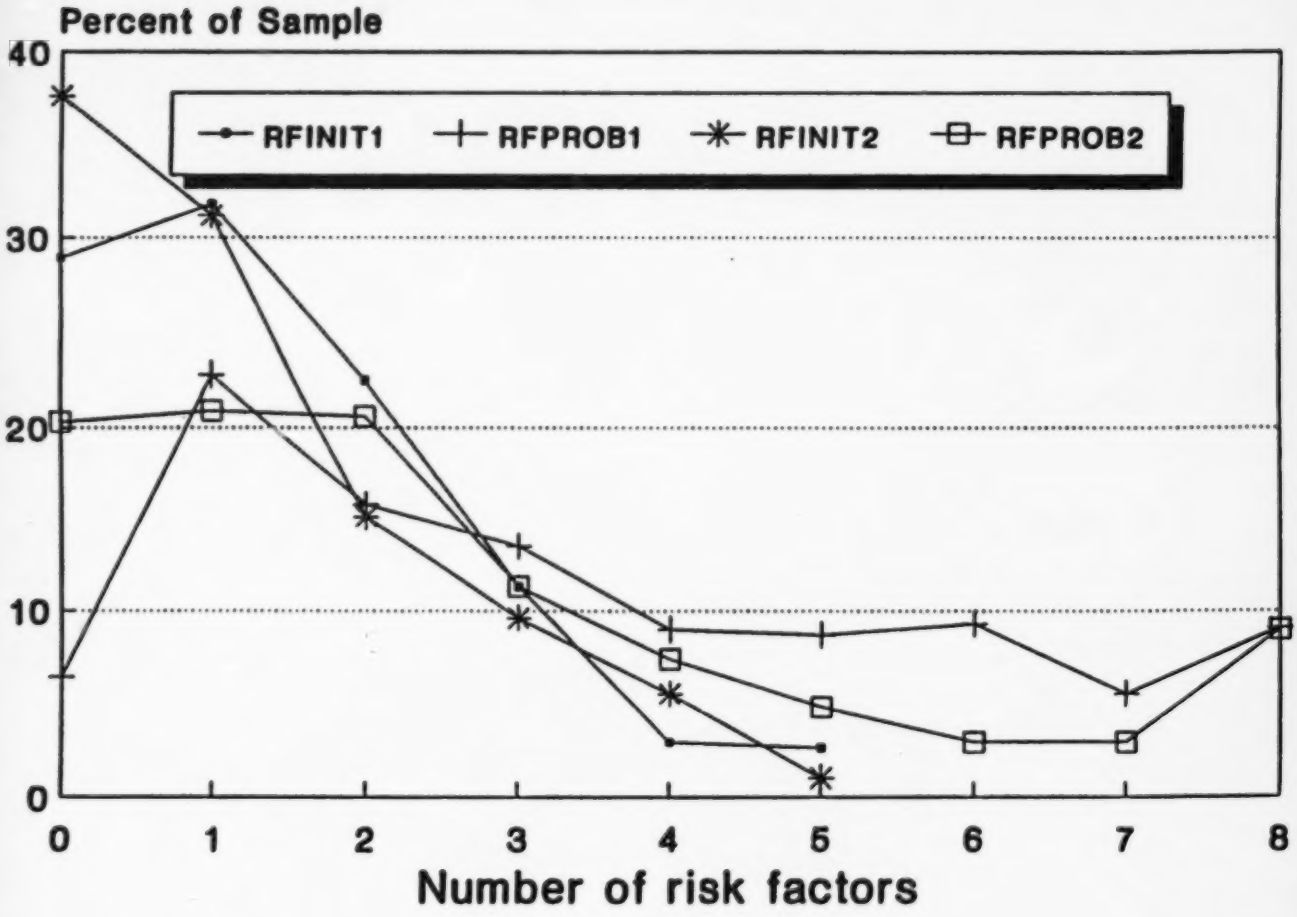


Table 4

Standardized Maximum Likelihood Factor Loadings and Residual for Final Confirmatory Factor Model

T1 Measures

Measure	POLYDRUG1 Factor Loading Estimate[b]	Residual[a] Estimate
Alcohol	.532	.847
Cigarettes	.739	.674
Marijuana	.880	.476
Cocaine	.573	.819
Hard Drugs	.530	.848

T2 Measures

Measure	POLYDRUG2 Factor Loading Estimate	Residual Estimate
Alcohol	.620	.785
Cigarettes	.597	.802
Marijuana	.806	.593
Cocaine	.506	.863
Hard Drugs	.541	.841

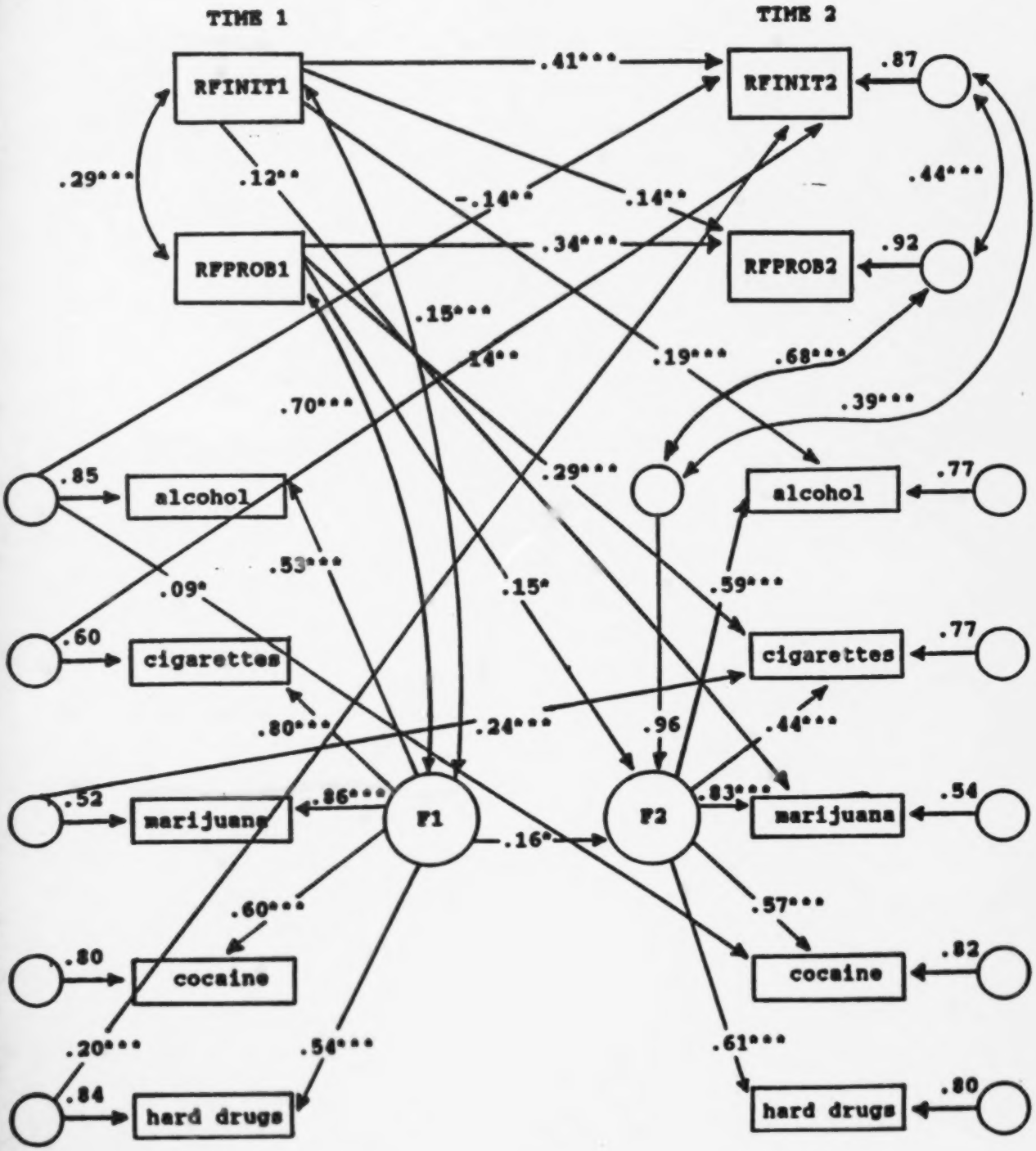
Note. All loadings significant at the $p < .001$ level.
[a] Residual term squared equals the proportion of error variance accounted for when predicting dependent variable.
[b] Interpret as a partial regression effect.

Table 5

Confirmatory Factor Intercorrelations: Measurement (CFA) Model using EQS

	RFINIT1	RFPROB1	RFINIT2	RFPROB2	POLY1	POLY2
Initiation (T1) Risk Index	1.0	.29***	.38***	.21***	.14**	.15*
Problematic (T1) Risk Index		1.0	.11*	.37***	.66***	.38***
Initiation (T2) Risk Index			1.0	.43***	.12*	.41***
Problematic (T2) Risk Index				1.0	.33***	.75***
Polydrug Use (T1)					1.0	.38***
Polydrug Use (T2)						1.0

Note. Residual correlations: ALC1,CIG1 = .26***; CIG1,COC1 = -.12***; COC1,HARD1 = .74***; ALC1,ALC2 = .33***; CIG1,CIG2 = .66***; MAR1,CIG2 = .40***; MAR1,MAR2 = .59***; MAR2,HARD2 = -.20*; COC2,HARD2 = .41***.
*p< .05. **p< .01. ***p< .001.


TIME 1
TIME 2
RFINIT1
RFINIT2
RFPROB1
RFPROB2
alcohol
alcohol
cigarettes
cigarettes
marijuana
marijuana
cocaine
cocaine
hard drugs
hard drugs
F1
F2
.41***
.87
.29***
.12**
-.14**
.14**
.44***
.34***
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